Space Weather Forecast

Issued on Saturday, 17 June 2023 at 01:11 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Minor/Moderate R1/R2 radio blackouts throughout. Reducing chance of further G1 Minor geomagnetic storms this UTC weekend.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been moderate over the UTC day of Friday 17 June, with three Moderate-class flares observed from three different sunspot group sources: at 16/0530UTC; 16/1036UTC and 16/1939UTC.

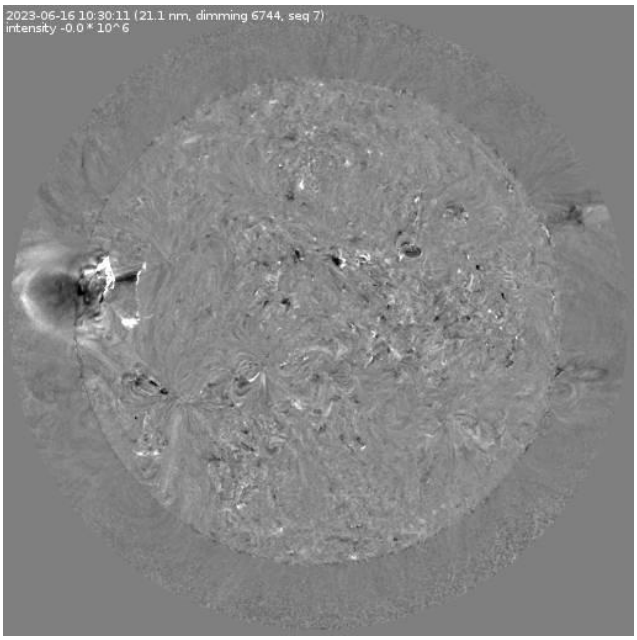

Figure 1:Extreme UV time-integrated satellite image of the CME immediately preceding the 16/1038UTC Moderate-class X-ray flare from a sunspot group near the eastern solar horizon. This CME has been modelled and passes behind the track of the Earth's orbit to no effect. Image processing courtesy of SIDC ROB.

The population of front-sided groups fell overall in the 24 hours, with up to nine visible for a time, but only five surviving by the end of the UTC day. The casualties included one of the most active groups, which had been responsible for one of the Moderate flares.

Main trends in the remaining groups were a fading of intermediate spots in a large an d nominally complex southern cerntal group, while the most complex in the southeast developed some central spots that then migrated to the extremities of the group.

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There remain a number of large 'filaments' (arcs of plasma that can leave the Sun as Coronal Mass Ejections (CMEs)) on the Earth-facing side of the Sun, not least one near the middle of the visible face which would be likely to have an Earth-directed component should it lift off in the near-term. Peripheral CMEs observed in the period have been modelled and none carry an Earth-directed component.

Solar Wind / Geomagnetic Activity: The solar wind was reflective of ongoing connection to a strong 'coronal hole' fast wind. Within strong levels throughout, the solar wind speed rose slightly in the UTC early hours, with a very gradual reducing trend that partially reversed into the UTC evening. The number of particles in the solar wind was level and near background levels throughout. The associated magnetic field peaked at the start of the reporting period at slightly elevated levels, with a step-wise reduction after 03UTC. The north-south component was mainly anti-aligned with Earth's field (to greater effect), with this magnitude lessening with time.

The net result of the above solar wind measures was provisionally an erratic and gradual decrease from Moderate Geomagnetic Storm G2, peaking in the 03-06UTC interval, with all four UTC morning three-hour intervals at or above G1 Minor Storm. The UTC afternoon and evening then saw quieter activity.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a chance of further Moderate-class X-ray flares, with a very tentative increasing risk in the outlook as more regions are expected to arrive than leave.

Solar Wind / Geomagnetic Activity: No CMEs feature in the current forecast, which is therefore an uncertain reduction in the current fast wind from an intense coronal hole and perhaps an adjoining more 'diffuse' successor.

Initially strong solar wind speeds should gradually decrease to elevated levels through Saturday 17 June, probably surviving at slightly elevated 18-19 June. Geomagnetic activity is forecast to see a surviving chance of further G1/Minor Storm conditions at first. Geomagnetic activity is expected to decline day-on-day, likely becoming reliably quiet by Tuesday 20 June.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with a very gradually increasing S1 risk with westward progress of the current configuration of front-sided sunspot groups.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	25	5	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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